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develops directly into the embryo sac, as in *Lilium*, the four megaspores, not separated by walls, all taking part in the formation of the sac. The two male cells retain their form even after passing to the end of the pollen tube. Double fertilization was observed. The diploid and haploid chromosome numbers are 38 and 18. The first four cells of the endosperm are long and tubelike, extending from the egg to the antipodals.

Various genera of the Saxifragaceae, Araliaceae, Caprifoliaceae, and Ranunculaceae, with which various systematists have supposed *Adoxa* to be related, were studied for comparison, and one of these genera (*Sambucus*) shows so many resemblances that the similarity could hardly be accidental. For instance, both have ovules with a single integument and a single archesporial cell which develops into the embryo sac according to the *Lilium* type; the wall of the anther, the cytological details of the development of the pollen (including the number of chromosomes), and the structure of the mature pollen grain are so identical that the two forms can hardly be distinguished in these respects; the long persistence of the organized male cells is the same in both, and resemblances in the grosser morphology were already well known. The conclusion is reached, and it seems to be based upon an unusually wide range of evidence, that there is no need for the family Adoxaceae, and that *Adoxa* should be placed in the Caprifoliaceae in the tribe Sambuceae.—CHARLES J. CHAMBERLAIN.

Geotropism.—Under a very pretentious title, GILTAY⁸ discusses and describes a number of experiments on some of the “fundamental questions of geotropism.” The article is more a contribution to the teaching of the subject than to knowledge. He gives an excellent method for lecture demonstration of the force with which a geotropically bending primary root turns downward. He also points out that we have never proved that gravity is the only stimulus involved in the turning of the primary root toward the center of the earth. The only evidence we have for this is qualitative. KNIGHT showed (1806) that as the centrifugal force was increased on a centrifuge with a vertical axis the root and stem took more nearly the horizontal position; but he did not show any relation between the position of the stem and root and the resultant of the two forces which he assumed to be involved (gravity and centrifugal force). In short, KNIGHT showed that at least in part the so-called geotropic stimulus is the gravity stimulus, but he did not show that the gravity stimulus is the only stimulus involved. GILTAY urges the necessity of showing that the position taken by orthotropic organs on such a centrifuge is the resultant of the two forces, if we are to be assured that the geotropic stimulus is identical in nature with the gravity stimulus and with the stimulus of centrifugal force. The resultant of the two forces ought of course to be the position taken, provided the two forces do not differ from each other by many fold, for we must remember that WEBER’S

⁸ GILTAY, E., Einige Betrachtungen und Versuche über Grundfragen beim Geotropismus der Wurzel. Zeitschr. Botanik 2:305-331. 1910.

law applies in geotropism as in various tropic responses. GILTAY devised a special centrifuge with a vertical axis for testing this point. He finds that with the average of 368 tests, with the angle of the resultant approximating 45° , the primary root fell 2.1° below the resultant. This deviation can well be accounted for by the variation in speed of rotation and the variation of roots themselves. This seems to furnish evidence for the identity in nature of the geotropic and centrifugal stimuli.—WILLIAM CROCKER.

Rôle of hydrocyanic acid.—TREUB⁹ has found that the amount of hydrocyanic acid in plants of *Sorghum* increases during the day, not due to the direct action of light, but in proportion to the formation of the products of the assimilation of carbon. It was already known, from investigations with *Pangium edule* and *Phaseolus lunatus*, that light has no part in the formation of hydrocyanic acid except as it favors photosynthesis. Much the same results have been obtained with *Prunus javanica*. *Passiflora foetida* and at least four other plants offer examples for the demonstration of the direct proportion between the formation of hydrocyanic acid and the function of chlorophyll. This can be demonstrated also by the use of variegated leaves. The amount of acid is usually greatest in the young leaves and gradually diminishes as the leaves grow older. With *Sorghum*, young leaves grown in a dry season or on dry soil contain much acid, and for this reason are dangerous as food for stock. Leaves about to fall contain very little acid, while, with only two exceptions, those already fallen contain none. GUIGNARD found that fallen leaves of *Sambucus nigra* contain much of the acid. TREUB confirms these results and finds the same to be true of fallen leaves of *Indigofera galeoides*. The hydrocyanic acid is probably the first recognizable simple organic product of the assimilation of nitrogen, and perhaps the first organic nitrogen compound formed. The amounts of the acid in plants watered with a solution of sodium and potassium nitrate increased or decreased in proportion to the amount of nitrate used. RAVENNA and PELI think that nitrates and carbohydrates are necessary to the formation of the acid. TREUB agrees with these conclusions, and adds that dextrose is especially essential. The acid probably does not occur in plants as such, but in the form of a glucoside from which it can be liberated by an enzyme or by boiling water.—R. CATLIN ROSE.

Parasitic flagellates in plants.—Although rapid progress in the study of parasitic flagellates has shown them to be of widespread occurrence in animal organisms, the discovery of these parasites in plants is a noteworthy fact. The occurrence of a trypanosome-like parasite in the latex of *Euphorbia pilulifera* in Mauritius was first reported by LAFONT.¹⁰ The discovery was soon afterward

⁹ TREUB, M., Nouvelles recherches sur le rôle de l'acide cyanhydrique dans les plantes vertes. Ann. Jard. Bot. Buitenzorg II. 8:84-118. 1910.

¹⁰ LAFONT, A., Sur la présence d'un parasite de la classe des Flagellés dans le latex de l'*Euphorbia pilulifera*. Compt. Rend. Soc. Biol. 66:1011-1013. 1909.